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Plumage ontogeny and taxonomic status of the Dusky Starfrontlet *Coeligena orina* Wetmore.

by Robert Bleiweiss

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In 1951, the indefatigable collector M. A. Carriker, Jr. obtained a peculiar specimen of the hummingbird genus *Coeligena* at 10,500 ft on the Páramo de Frontino, an isolated páramo at the northern end of the Western Cordillera of Colombia. Wetmore (1953) subsequently described this bird as a new species, *Coeligena orina*, the Dusky Starfrontlet, based principally on its unusual plumage. The holotype was distinguished from its congeners by an iridescent dark green body and the absence of the brightly coloured frontlet and black hood typical of the so-called "Starfrontlet" *Coeligena* hummingbirds (Table 1).

Coeligena orina is still known only from the holotype (USNM 436219), which Wetmore believed was a fully adult male. While examining the holotype, however, I noticed numerous corrugations on the horny sheath of the bill. Bill corrugations in hummingbirds occur only in immatures. Their number decreases with ontogeny and provides a good indicator of relative age (Ortiz-Crespo 1972, Stiles & Wolf 1974, Bleiweiss 1985). Because of its numerous bill corrugations, there is no doubt that the holotype of *C. orina* is an immature bird. Taxonomic evaluation of this

TABLE 1

Colour characteristics of adult and immature (imm) male *Coeligena bonapartei* subspecies and *C. orina*; only features with significant ontogenetic variation are listed for immature *C. bonapartei*. Colour names in table and text (except bronze) correspond to names of colour swatches in the *Naturalist's Color Guide* (Smithe 1975). F = frontlet; H = hood; TS = throat spot; BR = breast; BY = belly; UNTC = under tail coverts; RUTC = rump and upper tail coverts; TAL = tail; TERT = tertials.

	F	H	TS	BR	BY	UNTC	RUTC	TAL	TERT
b. eos (adult)	apple green	black	spectrum violet	lime green	spectrum orange	cinnamon	spectrum orange	cinnamon tipped bronze	cinnamon
b. eos (imm)	dark green edged black	dark green edged black	spectrum violet		bronze to spectrum orange		bronze to spectrum orange		
b. bonapartei (adult)	apple green	black	spectrum violet	spectrum green	spectrum orange	bronze green edged cinnamon	spectrum orange	bronze	blackish
b. bonapartei (imm)	dark green edged black	dark green edged black	spectrum violet		bronze to spectrum orange		bronze to spectrum orange		
orina	dark green edged black	dark green edged black	spectrum blue	dark green	lime to yellow-green	lime green	lime to yellow-green	lime to parrot green	blackish

unique specimen therefore requires consideration of the possible ontogenetic nature of its unusual characteristics.

Based on plumage colour, *C. bonapartei* appears to be the nearest relative of *C. orina* within *Coeligena* (Wetmore 1953). To evaluate age-related plumage characters in *C. orina*, I compared its plumage to that of the ontogenetic stages of male *C. bonapartei eos* and *C. b. bonapartei* (Table 1, Fig. 1). The third subspecific taxon *C. b. consita* (Wetmore & Phelps 1952) is known only from 4 female specimens. Starfrontlet *Coeligena* are sexually dimorphic, so I sexed specimens without gonad data by plumage and measurements. I used specimens with accurate locality data to evaluate plumage ontogeny and mensural variation. Based upon these comparisons, the holotype of *C. orina* appears to be an immature of a subspecies of *C. bonapartei*. This conclusion is also supported by variation among trade skin specimens, which lack accurate locality data.

All specimens of adult male *C. bonapartei* which I examined had a large glittering apple green frontlet (33–48 feathers, N = 18), a black hood extending from the posterior border of the frontlet to the nape, and a glittering spectrum violet throat spot (15–42 feathers, N = 17). All immatures had well developed pennaceous body and flight feathers and like *C. orina* (Carriker field notes), were probably fledged birds. I detected significant variation in crown, throat and body colours, which were all less developed or absent among immatures.

Crown. Most immature male *C. bonapartei* lack a glittering frontlet, which appears to develop before the bill corrugations disappear (Fig. 1). The actual moult was evident in one male with an intermediate number of bill corrugations; the entire forecrown was covered with glittering green

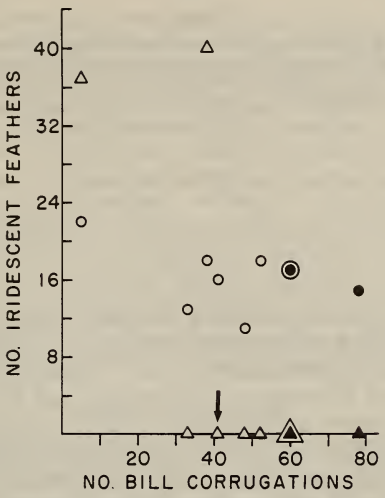

Figure 1. Ontogeny of the frontlet and throat spot in *Coeligena bonapartei*. Numbers of bill corrugations and iridescent feathers were estimated by the methods outlined by Bleiweiss (1985). Fewer corrugations indicate birds of relatively greater age. Triangles are counts of glittering frontlet feathers. Circles are counts of glittering throat spot feathers. The arrow indicates the individual with extensive moult of the frontlet (see text for discussion). Open symbols are for *C. b. eos*, solid symbols are for *C. b. bonapartei*. The double symbols are for *C. orina*.

feathers still enclosed within their sheaths (44 feathers). In immature *C. bonapartei* that lack a frontlet, crown feathers are bicoloured, dark green edged with black. This is precisely the colour of crown feathers in *C. orina*. The black hood in *C. bonapartei* develops gradually only after the frontlet appears, through an anterior to posterior replacement of the bicoloured feathers behind the frontlet. Black hood feathers were absent in the bird with the moulting frontlet, were limited to a narrow posterior border to the frontlet in the bird with an intermediate number of bill corrugations, and extended to the midcrown in the bird with the fewest bill corrugations. Since *C. orina* has many bill corrugations, it is a relatively younger bird. The absence of the typical Starfrontlet colouration on its crown is probably due to the usual late development of these features in the Starfrontlet ontogeny.

Throat spot. Although the throat spot appeared to increase in size through the ontogeny of *C. bonapartei* (Fig. 1), there was considerable variation in the number of throat spot feathers among adults. The two subspecies differed in the number of throat spot feathers (*C. b. eos*, 18–42, N = 17; *C. b. bonapartei*, 15–18, N = 2). Therefore the small size of the throat spot in *C. orina* (17, plus one sheathed feather) may reflect either an early stage of development, or an individual or geographic difference. In *C. orina* only one new throat spot feather was still partly sheathed, which may indicate that the throat spot was approaching its adult size.

TABLE 2

Mean, ±one standard deviation, sample size for mensural characters of adult male *C. bonapartei* subspecies and *C. orina*. EC = exposed culmen; CF = culmen from flange of nasal operculum; P = chord of outer primary; WB = chord of wing from butt to tip; OT = outer tail feather. Sample sizes are in parentheses.

	EC	CF	P	WB	OT
C. b. eos	28.46±0.81 (15)	35.25±0.77 (16)	54.21±1.31 (14)	72.32±1.67 (13)	47.30±1.18 (13)
C. b. bonapartei	26.9, 31.4 (2)	32.3, 36.5 (2)	54.0, 54.6 (2)	71.9, 72.6 (2)	50.9 (1)
C. orina	30.8	36.1	54.7	72.0	47.1

Body Colour. Wetmore described the body colour of *C. orina* as dark green, noting that it lacked any of the bronzy (to orange) sheen present on the rump, upper tail coverts and belly of *C. bonapartei*. My examination of *C. orina* supports Wetmore's description, but I noted some bronzy reflections on the upper tail coverts and belly. Bright spectrum orange feathers appear on the rump, upper tail coverts and belly of immature *C. bonapartei* and increase in number with age; thus the bright feathers on the lower back and belly of *C. orina* (Table 1) may be more extensive in adults.

Other aspects of plumage colouration did not appear to vary with ontogeny. Thus, only the following colour characteristics do not vary with age among fledged male *C. bonapartei* and on this basis may be distinctive for *C. orina*: a throat spot that is spectrum blue (*orina*) rather than spectrum violet (*bonapartei*), under tail coverts that are uniform lime green (*orina*) rather than cinnamon (*eos*) or bronze green edged cinnamon (*bonapartei*), a tail that is parrot to lime green (*orina*) rather than cinnamon tipped bronze (*eos*) or bronze (*bonapartei*), a breast that is dark green (*orina*) rather than lime (*eos*) or spectrum (*bonapartei*) green, and a rump, upper tail coverts, and belly that are dark green mixed with lime and yellow-green with some bronzy reflections (*orina*) rather than spectrum orange (*bonapartei*) (Table 1). Wetmore mentioned that the wings and under wing coverts were darker in *C. orina* compared to *C. bonapartei*, but the slight differences were hard to evaluate.

My measurements corroborate Wetmore's observation that the bill of *C. orina* is slightly longer than in adults of either subspecies of *C. bonapartei* (Table 2). This may be another reliable difference, since bills of immature hummingbirds are typically shorter than those of adults.

These data indicate that the most distinctive plumage features ascribed to *C. orina* by Wetmore (1953) correspond to an ontogenetic stage in related *C. bonapartei* and are therefore probably age-dependent. Consequently, description of adults will be necessary to determine the degree of differentiation of this isolated population. On the other hand, on the basis of the features of the holotype that are not age-related, the taxon might be considered a subspecies of *C. bonapartei* (see also Meyer de Schauensee 1959), since it is no more distinct than males of the currently recognized subspecies. Assessment of *orina* as a subspecies is consistent with the pattern of moderate and probably infraspecific differentiation among other endemic hummingbird taxa in the northern Western Cordillera:

Eriocnemis vestitus paramillo (previously described as a distinct species–see Chapman 1917), which also occurs at the northern end of the Central Cordillera at the Páramo de Sonsón (Bleiweiss MS), and *Metallura williami recisa* (Wetmore 1970). Although geographically isolated highlands often harbour endemic hummingbird species, the greatly reduced extent of high altitude habitats in the northern Western Cordillera may retard differentiation of endemic high altitude trochilofauna there (Vuilleumier 1970).

The following specimens were measured (acronyms are defined in the acknowledgements):- *C. b. eos* adults: AMNH 37523, 100522–23, 113510, 177188, 182347, 482780, 482785, 482787; ANSP 65386; CM 37276, 8912, 89945; immatures: MCZ 94723; MLOC 1417, 1419, 1422; USNM 149154, 354747. *C. b. bonapartei* adults: AMNH 121588; DEL 56781; immatures: WFVZ 21698. *C. orina* immatures: USNM 436219.

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